Para
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Sectt. II-27—[illegible]

M

Development (1951) Department.

MS SERIES.

G.O. NO. 290

Dated 19.1.57

FOR MYSORE STATE

[Despatch Abstract.]

Mines - GS Report entitled 'Note on Malavi Dam site, Kudligi Taluk, Bellary Dt by Sri. K.V. Subramanyam' Returns recorded.

5

GEOLOGICAL SURVEY OF INDIA
ENGINEERING GEOLOGY AND GROUND WATER DIVISION

TELEGRAMS: GEOLOGICAL, CALCUTTA.
TELEPHONE: WEST 369.

27, CHOWRINGHEE ROAD,
CALCUTTA 13.

No /677 /EGTSE(1) 16th November, 1950

FROM
Dr. J. B. AUDEN
Superintending Geologist

Ref.

Sub :- **117256**

To

The Secretary,
Government of Madras,
Development Department,
Ft. St. George,
Madras.

Dear Sir,

I enclose herewith a copy of a report entitled 'A Brief Note on the Malavi Dam Site, Kudligi Taluk, Bellary District' (October, 1950) written by Dr. V. Subramanyam of this Department. Would you kindly acknowledge receipt.

ASSISTANT SECRETARY TO GOVERNMENT
25 NOV 1950
5386
WORKS DEPARTMENT

Yours faithfully,
J B Auden.
(J. B. Auden)
Superintending Geologist,
E.G. -G.W. Division.

DCOI
P. W. D. Sec.
22-11-50
22-11-50.

Enclo: 1.

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GEOLOGICAL SURVEY OF INDIA
ENGINEERING GEOLOGY AND GROUND-WATER DIVISION

3 E1

TELEGRAMS: GEOLOGICAL, CALCUTTA.
TELEPHONE: WEST 369.

27, CHOWRINGHEE ROAD,
CALCUTTA 13.

No /678/EG795(1) 16th November 1950

From
Dr. J. B. AUDEN
Superintending Geologist

Ref
Sub :-

To
The Secretary,
Revenue Department,
Government of Madras,
Madras.

Dear Sir,

I enclose herewith a copy of a report entitled 'A Brief Note on the Malavi Dam Site, Kudligi Taluk, Bellary District' (October 1950) written by Mr. V.Subramanyam of this Department. Would you kindly acknowledge receipt.

Yours faithfully,

(J. B. Auden)
Superintending Geologist,
E. G. - G.W. Divn.

Enclo: 1.

Dev. (J) Dept. 5

56
11/1

126769
Letter No. ~~117256~~ J/50 - 2 & 10-12-50.

To

The Superintending Geologist
Engineering Geology & Groundwater Division.
Geological Survey of India
No. 27, Chowringhee Rd., Calcutta.

Sir,

Sub:- G.S.I. Report entitled "A Brief note on the Malaprabha Dam Site, Kudligi Tk, Bellary Dist," by Sri V. Subramaniam.

Ref:- Your letters ~~addressed~~ No. 1679/E.G.795(1) dt 16/11/50 addressed to this Dept and to the Rev Dept.

I am to acknowledge with thanks the receipt of the copies of the reports referred to above and to suggest that separate copies of such reports need not be ~~separately~~ sent to the Rev. Dept in future.

10.12.50.

Why are copies being sent to Rev Dept also.
When's the second copy in this particular Case
Do not Dev keep their copy?

11.12.50

Resubmitted

-- 2. The G.S.T. have been sending Copies to Dev. & Rev. apparently because they are not sure which depts. here is concerned - please see pp. 1 and 5 of (B), a similar case (I'm sued) (I'm sued) In that case, Dev. & Rev. transferred the pp. to us (Rev. transferred after acknowledging the receipt of the copies) - M. See pp 1 & 7-8 of (B) In this present case, ack. was not issued either in Dev. or in Rev.

PTO

2

(ii) the second copy is kept at the bottom of the case below G.S. at (B) — as mentioned

(iii) Copies are not being sent to P.W.D. Dev. & Rev. to whom they are sent are not keeping them but they are transferring to us.

R.A. 11.12.50

13.12.50

D.S.

The distribution list was perhaps furnished by Dev & the G.S.I. The report is a very technical one & it seems unnecessary for Govt to have a copy, in addition to the C.E. & the S.E. In any case it seems unnecessary for two copies to come to Govt (one to Dev & one

to Rev or Pwd). If one copy must be received by Gol. perhaps Dev may keep that copy in their records, because they ~~have~~ Suggest the programme to the G.S.I + Conduct general correspondence with them.

A

Pwd 5386J/50

12.12.50

126769

13.12.50

Dev (J) Depn.

FINANCE (EXPENDITURE) SECRETARY TO GOVERNMENT
14 DEC 1950
DEVELOPMENT GL

As I.

P.W. note from pp 1-3 above may be perused. This Dept may agree to P.W. Dy. Secy's suggestion at 'A' above. for orders.

2. ~~A copy of~~ The G.S.I has sent a copy of this report to the C.E (I) and the Supdg. Engineer concerned, direct. No action is therefore necessary

Σ Pwd

5 4

on this. The receipt of ten copies ~~of~~ may be acknowledged and the papers recorded. 2

A draft letter to the G.S.D and a despatch are submitted below for approval.

Rev 2 - P.W. may see before issue

Dkm
20/12/50.

Rev
21/12/50 P.W.D / Rev

P.W.D (J)

Dev. no no 126167 J/50.
dated 21-12-50

To AS

The notes of Dev., on pp 3-4 above may be perused and the file passed on to Rev.

Dev
26/12/50.

AM
27.12.50

Dev may also furnish a revised distribution list of the G.S.D. to the GSI

Rev 900424
Proc 6300 J/50-1291

Rev
28.12.50

Rev
30/12

INSTANT SECRETT
26 DEC 1950
6300
PUBLIC WORKS DEPARTMENT

5

To AS

Rev Dept

Please see the remarks from p-3 ante ~~of the draft letter below~~. ~~The draft letter is returned and~~ this file may be returned to Dev.

Rev' E

4/1/51 4.1.51

4.1.51

5/1/51 Dev

Dev

Dev. (J) Dept.

2438

Rev. V.O No 900424/50-T

5-1-51

Asi.

Please see the remarks the P.W and Rev Depts ~~on~~ pp 4-5 above.

2. With reference to P.W. Dy. Secy's remark at 'X' on p 4 above, it is submitted that the G.S.I usually send copies of their reports ~~only~~ to this Dept. only. In this case the G.S.I have sent

[P.T.O.

6

a copy to the Rev Dept., presumably under the impression that ~~they~~ Rev may be interested in the report.

It is submitted that a distribution list as such, has not been furnished to the Dr. S.I. It is therefore for orders whether the draft letter (as below, as) already proposed, may issue.

Sd/- 10.1.51.

Sd/- 10.1.57

Subject:- Mines - G.S.I. Report entitled 'A Brief note on the Malavi Dam site, Kudlghi Taluk Bellary Dt" by Shri V. Subramanyam Geologist Recorded.

Ref:- From the Supdtg Geologist S.G.I. G.W. Division Letter No. 1679/8g 7750 dated 16.11.56.

Order (MS) No 290 dated 19.1.57

Recorded.

Issued as Letter No 126769 J/50-2 dated 10.1.57

To AS.

With reference to orders at 2 and 4 above the papers may now be recorded (~~Orders are solicited~~).

Sd/- 19.1.57 Sd/- 19.1.57.

Sd/- 19.1.57

6

a copy to the Rev Dept., presumably under the impression that ~~they~~ Rev may be interested in the report.

It is submitted that a distribution list as such, has not been furnished to the Dr. S. I. It is therefore for orders whether the draft letter (below, as) already proposed, may issue.

10 1.51.

Sub:- Mines - G.S.I. Report entitled 'A Brief note on the Malavi Dam site, Kudlghi Taluk Bellary Dt" by Sri V. Subramanyam - Geologist Recorded

Ref. From the Supdtg Geologist S.G.I. Western Division letter no 1679/89 7750) dated 16.11.50.

Order (MS) No 290 dated 19.1.5

Recorded.

Subordinate Letter No 126769 J/50-2 dated 10.1.51

To As-

With reference to orders at 2 and 4 above the papers may now be recorded (~~Orders directed~~).

19.1.51 19.1.51.

GEOLOGICAL SURVEY OF INDIA

A BRIEF NOTE ON THE MALAVI DAM SITE, KUDLIGI TALUK, BELLARY DISTRICT

By

V. SUBRAMANYAM, M.A.,
Geologist, Geological Survey of India,

October 1950.

A BRIEF NOTE ON THE MALAVI DAM SITE, KUDLIGI TALUK, BELLARY DISTRICT.

(October 1950)

by

V. Subramanyam, M.A.,
Geologist,
Geological Survey of India.

C O N T E N T S.

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Plates.

I. Showing location of Malavi dam site, Hagaribommanahalli Project, Kudligi Taluk, Bellary District, Scale 1" = 1 mile.

II. Cross sections of earth dam, scale 1/400 natural

III. L.S. along the proposed dam line showing test pits and bore-holes put down.
Scale Horizontal - 1/4000
Vertical - 1/100

A BRIEF NOTE ON THE MALAVI DAM SITE, KUDLIGI TALUK, BELLARY DISTRICT

(October 1950)

by

V. Subramanyam,
Geologist,
Geological Survey of India.

INTRODUCTION.

1. As a part of the programme of the Grow More Food Campaign of the Government of Madras, with which is connected the Hagaribommonahalli Project, I carried out a preliminary reconnaissance of the Malavi dam site across the Chikka Hagari, a tributary of the Tungabhadra in the first week of February 1950.

2. I wish to express my grateful thanks to the Chief Engineer, P.W.D., Madras, and the officers of the Special Division, Anantapur for help rendered to me during my inspection.

DAM SITE

(i) General

3. The site is about 27 miles S.S.W. of Hospet (57A/7; 15°16' : 76°3') from where it can be approached by a motorable road. It is also a mile to the W.N.W. of Malavi R.S. (57B/1; 14°59' : 76°12') on the Hospet-Kottur branch of the M. & S.M. Railway (see Plate I).

4. The purpose of the dam is chiefly storage, for irrigating about 6500 acres of land in the Hadagalli taluk of Bellary district.

(ii) Dam

5. At the site, the river flows E.-W. and the alignment of the dam, 7,000 feet long, runs roughly N.N.W.-S.S.E.

6. The dam will be a rolled-fill earth structure with hearting and casing sections, and a masonary core wall of random rubble in cement mortar in 1 : 4 proportion (see Plate II). It will have a basal width of 375 feet and a top width of 12 feet. The free board allowed is 9 feet. A front slope of 2 : 1 up to R.L. + 1720 will be given, with a berm at this level. Thence the slope will be 2½ : 1 up to ground level. The rear slope will also be 2 : 1 up to R.L. + 1716, with a berm at that level and then a slope of 2½ : 1. A rivetment of rip-rap will be provided on the front side to protect against wave action and filter drains in the rear section. There will be a 3 ft. thick clay blanket on the upstream side to varying widths alongside the alignment depending on the permeability of the soils met with and depth of standing water at any particular place.

7. The calculated hydraulic gradient for the above earth dam section has been found to fall well within the toe of the dam (see sections 2 and 3 of Plate II).

(iii) Spillway and Canals.

8. In order to cope up with a maximum discharge of 50,000 cusecs, an Ogee weir 700 feet long (between L.S. distances 2550 and 3250) and bye-washes of 600 and 530 feet lengths (between L.S. distances 1050 to 1650 and 2020 to 2550) have been provided in the low saddle on the left flank of the river. Topographic features are not suited for locating surplus arrangements in the right flank of the river (see Plate III).

9. The Ogee will be of random rubble in cement mortar in 1 : 4 proportion with crest level at + 1725. The bye-wash

portions will be cuttings in weathered rock. The approaches and escapes in front and rear of these portions will be excavated down to + 1725 to have a good draw off in such places.

10. Two canals of lengths 9½ and 12½ miles will take off from the left and right flanks of the river respectively. These will be located at L.S. distances 3800 and 6200 feet with sill levels at + 1704, 21 feet below the F.R.L.

11. Surplus water from the spillways will follow the natural slope in the rear of the dam and then into the natural drain, 1200 feet below the dam axis. This drain has a gradient of 1 in 50 or 100 towards the river. The bed levels of this drain range from + 1713 to + 1695.

12. (iv) Other Engineering details

Average bed level at the site	--	+ 1683
Full Reservoir level	--	+ 1725
Maximum Water level	--	+ 1730
Top Bund level	--	+ 1730
Height of the dam above the bed level	--	57 feet
Height of the dam above the expected deepest foundation level	--	81 feet
Storage capacity of the reservoir	--	2000 m.c.ft.
Waterspread area	--	5 square miles

Volume of dam

Casing material	--	78,00,000 c.ft.
Hearting material	--	70,00,000 c.ft.
Masonry structures	--	2,26,000 c.ft.

GEOLOGY

13. The rocks around the dam site are chiefly biotite and hornblende-biotite gneisses (mixed gneisses) having a general N.N.W.-S.S.E. strike with a dip of 70-75° towards the E.N.E. The strike of the rocks is more or less at right angles to the course of the river and this is usually considered as a favourable feature.

14. Intrusive into the gneissic rocks mentioned above are pegmatites or coarse granites which generally follow the foliation planes. A trap dyke is observed near the right and of the dam line between L.S. distances 7193 and 7263.

15. There is a hillock upstream of the dam line and about three furlongs from the left river margin (see Plate IV). This exposes mixed gneisses intruded by coarse pegmatites. This rock is extensively quarried for building purposes. There are also a few small outcrops og gneisses in the river bed, downstream of the dam axis. Excepting these, there are no other outcrops of gneissic rocks in the immediate vicinity of the dam site. Much of the area along the dam line is covered by red gravelly soil derived from the weathering of the pegmatites and granitic rocks or by black clayey soils.

16. Nineteen shallow test pits, of depths 2 to 10 feet, have been put down along the dam line at intervals of about 200 feet and most of these expose weathered or fairly fresh pegmatite. In a few the pegmatite has been observed to be only superficial, exposing gneisses below. In a few others, both gneisses and pegmatite are mixed up. Minor pockets of schists occur as intercalations in the gneiss in some of the pits.

17. The river bed is sandy and is about 275 feet wide. No calyx bore-holes have been put down for determing the thickness of the alluvial cover and depth to the bed rock. Hand borings (1C, 2C, 3C, 4C and 5C) show the deepest level to bed rock as + 1656.5. This can be taken as almost correct for our purposes. The alluvial soils below the river bed are chiefly sands, sands mixed with pebbles, loam and clay. The maximum thickness of these is about 27 feet in the deepest section (See Plate III).

SUITABILITY OF THE SITE.

18. From the data available and from an examination of the rocks met with in the area, the site appears quite suitable from the geological point of view. There does not appear to be any serious objection in founding the dam on the gneissic rocks which are largely permeated by pegmatitic rocks, in view of the fact that (i) there are no other bad features like faults, sheared or sheeted zones (ii) the low height of the dam (iii) the fact that the maximum height of standing water will be only 47 feet and (iv) rocks are met with at shallow depths of 2 to 5 feet along the alignment.

19. The site is also suitable from topographic considerations and other reasons given below:-

(i) The low saddle on the left flank is ideally suited for locating surplus arrangements:
(ii) Pervious and semi-pervious materials for the earth dam are available at the site; also stone for masonry work;
iii) The proposed site is the best possible site and best of three sites examined by the Engineers;
(iv) Road and rail facilities are close by;
and (v) Only three villages will be submerged by the reservoir.

RECOMMENDATIONS.

20. It is recommended that :

(i) Since the purpose of the dam is storage, the core wall in the deep section should be keyed on to fresh sound rock. Also it is suggested that open joints may be grouted and kaolinised zones scooped out and filled with concrete;

(ii) In the shallower sections (viz. on the flanks) it appears quite enough to take the cut-off to sufficiently impervious rock or half F.R.L. depth (half the depth of standing water at any particular place), whichever is less. It is meant by this that it is not absolutely essential to take the cut-off to fresh sound rock, as any small quantities of water, even if lost by percolation through the foundation rock, will be drained away at the toe;

(iii) the rear of ogee weir and bye-washes would require protection against retrogression as the coarse pegmatitic rocks in this tract are likely to be eroded easily;

(iv) the bye-wash portions, which will be mostly cuttings in weathered rocks, should be paved to protect against erosion of the coarse pegmatites; and

(v) Proper care should be taken to effect a good bond between the earth sections and the masonry constructions like the head sluice portions, as some dams have failed by seepage of water along such contacts.

SUMMARY OF OBSERVATIONS AND CONCLUSIONS.

21. In the first week of February 1950, I carried out a preliminary reconnaissance of the Malavi dam site across the Chikka Hagari, a tributary of the Tungabhadra, in the Kudligi taluk, Bellary district.

22. The site is 27 miles roughly S.S.W. of Hospet (57A/7; 15°16' : 76°23') and a mile to the W.N.W. of Malavi R.S. (57 B/1; 14°59' : 76°12') on the Hospet-Kottur branch of the M. & S.M. Railway (see Plate I).

23. The alignment of the dam, 7400 feet long runs N.N.W. - S.S.E. The dam will be a rolled fill earth structure with hearting and casing sections and a masonry core wall of random rubble in cement mortar. The height of the dam is 57 feet from the bed of the river or 81 feet above the expected deepest foundation level.

24. There will be an Ogee weir of length 700 feet and bye-washes of lengths 570 and 600 feet on the left flank of the river, to cope up with the maximum discharge of 50,000 cusecs. There will be also two canals, 9½ and 12½ miles long, on the left and right flanks respectively of the river, with sill levels at +1704.

25. The rocks around the dam site are chiefly biotite and hornblende-biotite-gneisses (mixed gneisses) largely permeated by coarse pegmatites of granites. Much of the area along the dam line is covered by red gravel or black clayey soils. The strike of the gneissic rocks is N.N.W.-S.S.E. and dip 70 to 75° towards E.N.E.

26. Nineteen shallow test pits of depths 2 to 10 feet at intervals of about 200 feet have been put down along the dam line. Many of these expose weathered or fairly fresh pegmatites. In some pits these are only superficial, exposing the gneiss below.

27. From the data available at the time of visit and the rocks examined, the site appears to be quite suitable and there is no harm in founding the dam on the gneissic rocks, which are largely permeated by pegmatites. As no other weak features like sheared or sheeted zones or faults have been noticed in rocks at the dam site, and considering the low height of the dam and that the maximum depth of standing water would be only 47 feet, the site is considered as feasible..

28. The following recommendations are made:-

(i) As the purpose of the dam is essentially storage of water for irrigation, it is advantageous and advisable to take the core wall in the river section down to fresh sound rock and key it on to it. Fissures or open joints in the foundation rock should be sealed up by grouting. Kaolinised zones should be scooped out and filled with concrete;

(ii) In the shallower sections on either flank, where the depth of standing water will not be much, it appears to be enough to take the cut-off down to sufficiently fresh and impervious rock or half F.R.L. depth, whichever is less. By this it is meant that it is not so necessary to take down the foundations in these places to fresh sound rock, as any small quantities of water, even if lost by percolation through the foundation rock, will be drained away near the toe;

(iii) The rear of the ogee weir and bye-wash portions should be protected against retrogression;

(iv) By-wash portions should be paved to prevent erosion; and

(v) Proper bonding of earth and masonry sections should be effected as some dams have failed by seepage of water along such contacts.

29. Topographically also the site is good. Materials for earth dam and masonry core wall are available at site. Road and rail facilities are nearby. Only three villages will be submerged.

Engineering Geology &
Ground Water Division.
Calcutta 13.

V. Subramanyam
Geologist,
Geological Survey of India.

HKG: